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Abstract

ANALYSIS OF CAPITAL COSTS FOR NUCLEAR POWER PLANTS

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1. This paper reviews a capital-cost estimate for a typical 200-MW(e) heavy-water-cooled and -moderated nuclear power plant designed for construction in Canada. The system of accounts developed by Atomic Energy of Canada Limited and Canadian General Electric Company Limited for CANDU and NPD is described with particular emphasis on the type of costs included in the indirect charges. The estimate is broken down to show costs incurred because of local safety regulations, equipment or technique development of non-standard components and site labour; and capital-cost reductions for future nuclear plants are indicated.

2. Changes in investment-capital requirements if the nuclear plant were sold by Canadian industry for installation in an industrial foreign country - and alternatively in a developing foreign country - are estimated and the foreign and domestic capital contents are analyzed. Typical construction schedules and cash-flow analyses are presented as well as the effects of foreign exchange and domestic and foreign purchases on the investment-capital requirements. The effects of national architectural principles, local design requirements and site costs on the design and estimate are discussed, and a bill of material for the buildings of a typical plant located in Canada is illustrated. Site-labour costs for mechanized construction industries in Canada and Europe are compared with the lower labour costs of the developing countries.

3. Separation of the responsibilities of the seller, buyer and governments in the establishment and funding of the nuclear manpower training program is attempted.

4. The relative effect of plant size on certain cost components is illustrated for a range of outputs from 100 MW(e) to 500 MW(e).

5. The advantages accruing to an industry in subsidizing components for the initial plant are pointed out together with the danger of estimating the cost of future plants from that of the initial plant.

6. The desirability of common ground rules in the preparation of capital-cost estimates in the indirect-cost area is discussed.